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ABSTRACT

Health behaviors associated with chronic disease, particularly healthy eating and regular physical activity, are important role modeling opportunities for individuals working in child care programs. Prior studies have not explored these risk factors in family child care home (FCCH) providers which care for vulnerable and at-risk populations. To address this gap, we describe the socio-demographic and health risk behavior profiles in a sample of providers ($n = 166$ FCCH) taken from baseline data of an ongoing cluster-randomized controlled intervention (2011–2016) in North Carolina. Data were collected during on-site visits where providers completed self-administered questionnaires (socio-demographics, physical activity, fruit and vegetable consumption, number of hours of sleep per night and perceived stress) and had their height and weight measured. A risk score (range: 0–6; 0 no risk to 6 high risk) was calculated based on how many of the following were present: not having health insurance, being overweight/obese, not meeting physical activity, fruit and vegetable, and sleep recommendations, and having high stress. Mean and frequency distributions of participant and FCCH characteristics were calculated. Close to one third (29.3%) of providers reported not having health insurance. Almost all providers (89.8%) were overweight or obese with approximately half not meeting guidelines for physical activity, fruit and vegetable consumption, and sleep. Over half reported a “high” stress score. The mean risk score was $3.39 (\pm 1.2)$, with close to half of the providers having a risk score of 4, 5 or 6 (45.7%). These results stress the need to promote the health of these important care providers.

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1. Introduction

In 2014, there were an estimated 1.2 million child care providers in the United States, a number that is expected to steadily grow as working parents continue to need assistance in caring for their young children (Bureau of Labor Statistics 2016–2017). These providers make very low wages, with an average annual income of \$21,710 for full time work, making them one of the lowest paying occupations among education-related professionals and putting many of them at earnings below poverty (Child Care in America, 2015; Department of Health and Human Services, 2016). Individuals in low paying jobs are known to suffer disproportionately high rates of chronic health problems (Diez Roux

et al., 2002; Kanervisto et al., 2011; Kanjilal et al., 2006), however little attention has been given specifically to child care providers.

The daily routines of child care providers are stressful, physically demanding, and include exposure to infectious diseases such as influenza, hepatitis and diarrheal illnesses (Gratz and Claffey, 1996). Among the few studies that describe the health of child care providers, results suggest they have a high prevalence of many health problems and exhibit unhealthy behaviors, including being overweight or obese (Baldwin et al., 2007; Gratz and Claffey, 1996; Sharma et al., 2013), feeling emotionally strained (depressed, overwhelmed) (Baldwin et al., 2007; Gratz and Claffey, 1996; Todd and Deery-Schmitt, 1996; Whitaker et al., 2013), and failing to exercise regularly (Gratz and Claffey, 1996). These findings suggest that it is important to obtain a fuller understanding of the risk profile of child care providers.

Child care providers and their health are also important because of the role they play in shaping the health habits of young children. Early childhood is a critical period for developing life-long healthy habits (Cashdan, 1994; Dwyer et al., 2004; Skinner et al., 2002). During this critical developmental period, many children are enrolled in some form of child care and under the care of child care providers for several

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hours a day. In the U.S., approximately 12.5 million children under the age of 6 (61%) are currently enrolled in child care outside the home (US Census Bureau and Public Information Office, 2013). Furthermore, 70–80% of preschool-age children are in some form of child care for an average of 35 h a week (Larson et al., 2011a; Larson et al., 2011b; Ogden et al., 2012; Ward et al., 2008). For these children, child care providers can play a critical role in shaping health behaviors. One way in which a provider may influence the development of children's health behaviors is through role modeling (Larson et al., 2011b) for children and families. However, their own health problems may adversely impact their ability to be a positive role model and engage children in health promoting activities (Benjamin Neelon et al., 2011; Erinoshio et al., 2012; Hendy and Raudenbush, 2000; Nicklas et al., 2001).

Family child care homes (FCCH) are a specific form of licensed child care in which non-relatives care for children in their own homes rather than in a separate facility (i.e., a child care center). About one quarter of children under the age of 6 in child care attend a FCCH (Child Care in America, 2015) and for low-income children in non-relative care, more than one third are in FCCHs. Parents often enroll their child in a FCCH because it offers a more intimate, home-like setting with smaller groups of children (Browne, 2009). FCCHs also frequently offer flexible child care hours and more affordable enrollment fees compared to center-based care (Child Care in America, 2015; Bromer, 2001), which are particularly appealing to low-income families or parents employed in shift work. However, FCCH providers also tend to have less formal education and fewer professional development and mentorship opportunities (Fuligni et al., 2009). Additionally, regulations for FCCHs are often less stringent, including those around the promotion of good nutrition and physical activity habits in children (Benjamin et al., 2008; Slining et al., 2014). One study has also suggested that children enrolled in FCCHs are at increased risk for child obesity compared to those in center-based care (Benjamin et al., 2009). These characteristics heighten the importance of understanding providers' health behaviors and health status and the potential impact of provider health on the health behaviors of young children in their care.

Key health indicators known to contribute to chronic disease include lack of health insurance, overweight and obesity, physical inactivity, low fruit and vegetable consumption, stress, and inadequate sleep (Fung et al., 2001; Liu et al., 2013; Mozaffarian et al., 2016). Many of these health behaviors also represent important role modeling opportunities for individuals working in child care programs. No studies, to our knowledge, however, have explored these risk factors together in a sample of family child care home providers. Therefore, this study describes socio-demographic characteristics, and assesses the health risk behavior profiles in a sample of FCCH providers participating in an ongoing study in North Carolina.

2. Methods

This study uses baseline data from an ongoing cluster-randomized trial, *Keys to Healthy Family Child Care Homes*, that aims to promote healthy weight behaviors in young children enrolled in FCCHs. Full study details are provided elsewhere (Østbye et al., 2015) but are described in brief below. The study was approved by the Institutional Review Boards at the University of North Carolina at Chapel Hill and Duke University.

2.1. Sample and recruitment

A convenience sample of 166 FCCHs was recruited in multiple waves from counties across central North Carolina (NC) (Østbye et al., 2015). Within each county, community partners with established relationships with local FCCHs helped distribute study information via their preferred communication channels (newsletters, emails, partner website, trainings, group meetings). In addition, an invitation to participate in the study and a study flyer were emailed and/or mailed directly to all

licensed FCCHs in the county. Interest and eligibility were assessed during follow-up telephone calls. To be eligible for the study, FCCHs had to have at least two children between the ages of 18 months and four years in their care, have been in business for at least two years with reported no plans of closing in the coming year, and serve at least one meal (breakfast, lunch, or support) and one snack (morning or afternoon snack) to children in their care.

2.2. Data collection and measures

Data were collected during on-site visits to each FCCH, where providers completed self-administered questionnaires and had their height and weight measured.

2.2.1. Provider questionnaires

2.2.1.1. Demographics. Demographic questions included personal characteristics such as age, sex, race/ethnicity, household income, education, and health insurance status. This questionnaire also assessed characteristics of these FCCHs, including participation in the Child Adult Care Food Program (CACFP) and their star rating from NC's quality improvement rating system (QIRS). CACFP is a federally funded US program that provides reimbursement for meals and snacks served in child care programs that serve low-income families. The NC star rating is an indicator of quality based on a 5-point scale, where a rating of 1 star corresponds to meeting minimum licensing standards and 5 stars represents the highest quality and voluntarily compliance with higher standards related to programming and staff education.

2.2.1.2. Physical activity. Physical activity questions were drawn from the Behavioral Risk Factor Surveillance Survey (BRFSS) (CDC, 2011b). Providers were asked if they had engaged in vigorous or moderate physical activity during the past 7 days, and if so, to indicate the number of minutes from a set of 10 response options (10 min or less to >180 min, in 15 min increments). Providers also reported how many days in the last week they did strength training (range = 0–7 days). Total minutes from vigorous-intensity physical activity and moderate-intensity questions were summed. Based on national recommendations (CDC, 2011b), we categorized providers as not meeting recommendations if their moderate-to-vigorous physical activity (MVPA) was <150 min/wk and their strength training (ST) ≤1 day/wk. Those who did not meet MVPA recommendations or who did not meet the ST requirement were classified as not meeting this recommendation.

2.2.1.3. Fruit and vegetable intake. The 2000 Brief Block Food Frequency Questionnaire was used to assess provider's dietary intake. This questionnaire contains a reduced food list (approximately 70 food items) and takes 15–20 min to complete. It was designed to provide estimates of usual dietary intake. Questionnaires were sent to NutritionQuest for data entry and preliminary analysis. In the current study, we examined providers' vegetable and fruit intake only. To determine whether providers were meeting national recommendations for vegetable and fruit consumption, the NutritionQuest output for total grams of vegetables and fruits (for each of the vegetables and fruit reported) consumed on average per day (frequency of consumption is multiplied by standard portion sizes) was converted into cup equivalents. To calculate total cups of vegetables consumed per day, the total number of grams consumed per day for each vegetable reported in the questionnaire was divided by the average number of grams per cup (150 g) for all vegetables except for vegetable soup (230 g) and salad (75 g). Consistent with the BRFSS definition of vegetables, we excluded French fries (CDC, 2011a). A similar process was used for fruits. We divided the total grams per day for each of the fruits reported in the questionnaire by 150 g per cup, except for applesauce (225 g) and for 100% juice (250 g) (USDA, 2015). Providers were classified as meeting vegetable and fruit recommendations if they consumed 2.5 cups or more of vegetables and 1.5 cups or

more of fruits, based on the 2015 Dietary Guidelines (DHHS and USDA, 2015). Those who did not meet the vegetable recommendation (i.e., consumed <2.5 cups of vegetables) or who did not meet the fruit recommendation (i.e., consumed <1.5 cups of fruit) were classified as not meeting this recommendation.

2.2.1.4. Other health behaviors. Scales from existing surveys were identified to assess providers' sleep and stress levels. Providers responded to a single item from the Medical Outcomes Study sleep scale (Hays et al., 2005), which asked providers to report the usual number of hours of sleep they get per night. Providers were categorized as not meeting National Sleep Foundation recommendations if they slept <7 h per night or >9 h per night. In addition, providers completed the Perceived Stress Scale (Cohen et al., 1983), a 10-item scale that captures how unpredictable, uncontrollable, and overloaded respondents find their lives to be. Each item in the scale is rated on a five point Likert-type scale (0 = never to 4 = very often). Positive items' scores are reversed and then all items summed. Total scores range from 0 to 20, with a higher score indicating greater stress. Based on existing literature and on the scoring instructions of the scale, a score of 20 or above is defined as "high stress", therefore a score of 20 was used as a "stress" cut point for this analysis (Cohen et al., 1983). Providers were also asked to rate their health (based on the response to the question, "Would you describe your current health status as excellent, very good, good, fair or poor?") (Zajacova and Dowd, 2011).

2.2.2. Height and weight

Trained research staff measured providers' height and weight using standardized procedures (National Center for Health Statistics. U.S. Department of Health and Human Services, 2004). In brief, height was measured to the nearest 1/8th inch on a Shorr stadiometer (Shorr Productions, Olney, MD) and weight was measured to the nearest 0.1 lb using a Seca digital scale model 874 (Seca Corporation, Columbia, MD). These measures were used to calculate provider body mass index (BMI). BMI was then used to categorize providers as normal weight (BMI ≤ 24.99) overweight (BMI 25.0–29.99), obese class I (BMI 30.0–34.99), obese class II (BMI 35.0–39.99) or obese class III (BMI ≥ 40.0).

2.3. Data analysis

We calculated the frequencies, percentages, means and standard deviations to describe characteristics of providers and their FCCHs. Given the non-normal distribution for cups of fruits and vegetables consumed we report medians instead of means. A risk score was calculated as the sum of the following six components: no health insurance, being overweight/obese (BMI ≥ 25.0), not meeting physical activity recommendations, not meeting fruit and vegetable recommendations, not meeting sleep recommendations, and having high stress. The risk scores had a potential range of 0–6, where 0 indicated no risk and 6 indicated high risk. SAS version 9.3, Cary, NC was used for all data management and analysis.

3. Results

3.1. Characteristics of providers and FCCHs

The sample included 166 FCCH providers, the majority whom were African-American (74.1%) and female (100%) (Table 1). Approximately one-quarter (24.5%) had a high school degree and approximately half (47.2%) reported having a child development associate's degree. Over half (57.1%) of the providers reported being married. More than three-quarters (77.6%) reported a total household income below \$50,000/year (approximate median income for the region), and 23.6% reported a very low income (<\$25,000/year). Slightly less than half (44.2%) reported having two adults living in their households. Nearly two-thirds

Table 1

Socio-demographic characteristics of family child care home providers.

	Total providers	
	(n = 166)	
	N	%
Sex		
Female	166	100.0
Age (mean ± SD)	49.4	9.1
Race		
African-American	123	74.1
White	30	18.1
Mixed race	10	6.0
Asian	2	1.2
Native Hawaiian or pacific islander	1	0.6
Hispanic/Latino		
No	158	95.2
Yes	8	4.8
Education		
High school graduate	40	24.5
Associate	81	49.7
Bachelor	37	22.7
Masters	5	3.1
Child development associate		
Yes	75	47.2
Marital status		
Single	25	15.3
Married	93	57.1
Separated	29	17.8
Divorced	10	6.1
Widowed	6	3.7
Annual household income		
Under \$25,000	38	23.6
\$25,000–\$50,000	87	54.0
More than \$50,000	36	22.4
Adults living in household		
1	48	29.5
2	72	44.2
3 or more	43	26.4
Self-rated health status		
Excellent	43	26.2
Good	106	64.6
Fair	14	8.5
Not sure	1	0.6

(64.6%) of the providers reported their health as being "good" and 8.5% reported as "fair." Most providers participated in CACFP (91.0%) (Table 2) and almost 68.1% reported having a NC star rating of 4 or 5. They reported working an average of 61.8 h per week (± 17.3) and that children spent approximately 9.6 h (± 1.4) per day in their care. Slightly less than half (37.8%) reported having other people working in their child care home and of those approximately half were paid workers (53.2%). The children they serve were 51% female, and on average, 32.5 months old (± 13.7).

3.2. Provider health characteristics

Close to one third (29.3%) of providers reported not having health insurance. Of those who did have health insurance, approximately half (55%) reported having private insurance, 4% reported being on Medicaid, and 12% reported "other" as health insurance type. The mean BMI was 33.2 ± 7.5 with almost all providers (89.8%) being overweight or obese. Furthermore, one third of providers were class II (BMI 35–39.99) or class III obese (BMI ≥ 40.0) (Table 3). Providers reported an average of 76.1 min (± 78.1) of total moderate-vigorous activity in the last 7 days, and 1.4 days (± 1.7) of muscular strength training per week. About half (51.8%) did not meet physical activity guidelines. The median vegetable consumption was 1.4 cups per day (range 0.2–8.7) and median fruit consumption was 1.3 cups per day (range 0.05–8.7), resulting in half of the providers not meeting fruit and vegetable recommendations. Average sleep time was an average 6.5 h per night

Table 2
Family child care home characteristics.

	Total providers (n = 166)	
	N	%
Home participates in CACFP		
Yes	151	91.0
North Carolina star rating		
1	8	4.8
2	5	3.0
3	40	24.1
4	68	41.0
5	45	27.1
Number of hours worked per week (mean \pm SD)	61.8	17.3
Number of hours per day average child is in their care (mean \pm SD)	9.6	1.4
Other people working in FCCH		
Yes	62	37.8

(± 1.3) with 57% not meeting the recommendation for sleep. The mean stress score was 22.2 (± 5.6) with 62.1% having a “high” stress score (> 20).

3.3. Health risk score

The mean risk score was 3.4 (± 1.2). Overall, health risk scores were approximately normally distributed. Approximately half of the providers (54%) had a score of 0, 1, 2 or 3. However, 45.7% of providers had a risk score of 4, 5 or 6 (Fig. 1).

4. Discussion

This study provides a picture of FCCH providers, specifically as related to their demographic and health risk behavior profiles. Among these

Table 3
Risk score components.

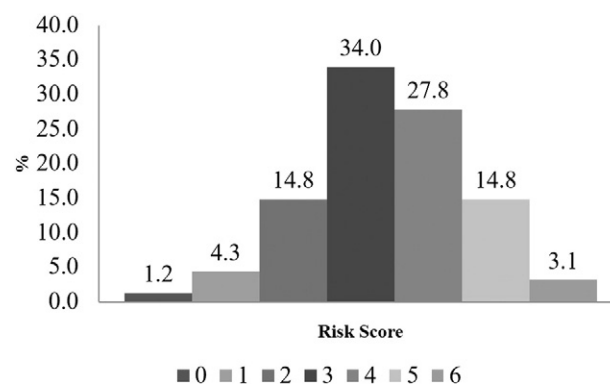
	Total providers (n = 166)	
	N	%
Has health insurance ^d		
Yes	116	70.7
BMI		
Normal weight (18.5–24.99)	17	10.2
Overweight (25.0–29.99)	40	24.1
Obese class I (30.0–34.99)	53	31.9
Obese class II (35.0–39.99)	28	16.9
Obese class III (≥ 40.0)	28	16.9
Overweight/Obese ^d		
Yes	149	89.8
MVPA ^a minutes per week (mean \pm SD)	76	78.1
Muscular strength training days per week (mean \pm SD)	1.4	1.7
Meets PA recommendations ^{b,d}		
Yes	80	48.2
Vegetable intake cups per day (median, IQR range)	1.4	1.6
Fruit intake cups per day (median, IQR)	1.3	1.4
Meets F&V recommendations ^d		
Yes	82	50.0
Hours of sleep per night (mean \pm SD)	6.5	1.3
Meets sleep recommendations ^d		
Yes	72	43.4
Stress score (mean \pm SD)	22.2	5.6
High stress ^{c,d}		
Yes	103	62.1

^a MVPA = minutes of moderate-to-vigorous physical activity.

^b Meets PA recommendations ≥ 150 MVPA/week and > 1 /week strength exercise.

^c High stress = score > 20 .

^d Variables with an asterisk contributed to risk score calculation.

**Fig. 1.** Percent distribution of risk score.

predominantly female, African-American providers, close to half had a cumulative risk score of 4, 5 or 6, indicating potentially high risk for developing a chronic disease (McEwen and Stellar, 1993; Myers et al., 1995; Serdula et al., 1996). Given the importance of role modeling to help shape child's health behaviors, these results suggest the need for future interventions with child care providers to improve their own health outcomes through improved health behaviors.

Comparing results from our study to a national sample of women and to other samples of child care providers, some interesting observations can be made. One quarter of the providers in the current study report having only a high school degree, a proportion similar to women participating in the National Health Interview Survey (23%), slightly higher than among samples of Head Start providers (20%) but lower than that reported as part of the National Survey of Early Care and Education (33%) (CDC, 2016a; Department of Health and Human Services, 2016; Whitaker et al., 2013). As highlighted in a recent report (Institute of Medicine and National Research Council, 2016), reported incomes of providers are very low and in our study, one quarter of providers reported incomes of less than \$25,000, a rate that is similar to what has been reported elsewhere in the literature (Department of Health and Human Services, 2016). With regard to their homes, the majority participate in CACFP, a proportion slightly higher than national reporting (66% in 2014) (Food Research and Action Center, 2014). Over half of the homes also had a star rating of 4 or 5, indicating that education and program standards are “high” and providers have gone through the necessary licensing requirements in addition to working voluntarily towards higher program and education standards.

The women in our sample were less likely to report being in excellent health compared to similarly aged women in national surveys: about 26% of our sample reported excellent health, compared to 55% of 45–65 year-old women participating in the National Health and Nutrition Examination Survey (NHANES) (CDC, 2015). Instead, most of the providers in our sample rated their health as good (65%), compared to 29% of the aforementioned NHANES subsample. Compared to a national sample of women, the prevalence of obesity among this sample of FCCH providers was much higher than the national average (66% of the current sample vs. 38% of women nationally and 57% of Black African-American non-Hispanics women). These FCCH providers were also more likely to be uninsured (29% vs. 12% nationally and 14% of Black African-American) (CDC, 2015). Compared to a national sample of FCCH providers, this sample also had a slightly higher number of providers who reported *not* having health insurance (30% of the current sample vs. 20% nationally) (Department of Health and Human Services, 2016).

However, providers in our sample were more likely to meet physical activity recommendations compared to a national sample of women and Black African-American women aged 45–65 (50% in our sample vs. only 20% in national samples) (CDC, 2015). Similarly, half of the providers in our sample met fruit and vegetable recommendations, a percentage higher than the NC BRFSS state level data (10% meeting

recommendations for fruit and 7% for vegetables) although data collection methods may not be directly comparable. Over 50% of the providers in this sample did not meet sleep recommendations, again a higher proportion than observed in the national averages for women (30–40%, depending on whether women are single vs. part of a two parent family) (CDC, 2016b). It is possible that these providers may not meet sleep recommendations because they engage in other activities that may disrupt their sleep; for example, data from a poll revealed that Black African-Americans are the most likely to report involvement in activities in the hour before going to bed every night or almost every night, specifically watching TV (75%) and/or praying or doing another religious practice (71%) (National Sleep Foundation, 2010).

The providers in our study reported a number of health behaviors that put them at heightened risk for chronic disease (Fung et al., 2001; Liu et al., 2013; Mozaffarian et al., 2016). Although using somewhat different measures, others have also found that child care providers may be an especially vulnerable population. In our cumulative risk score, we found that 46% of providers had a risk score of 4, 5 or 6. This result is similar to other studies with child care providers; having a high prevalence of overweight/obesity (Baldwin et al., 2007; Gratz and Claffey, 1996; Sharma et al., 2013), high prevalence of physical and mental health conditions, poor health status and frequent mentally and physically unhealthy days (Baldwin et al., 2007; Gratz and Claffey, 1996; Todd and DeerySchmitt, 1996; Whitaker et al., 2013). This extends the prior literature in that few studies have included family child care home providers as part of their research, but have rather focused on centers. Although providers themselves may be concerned about their own health, in particular their weight, (Sharma et al., 2013) and believe that they should engage in healthier behaviors (Hesketh et al., 2015), they may not have the appropriate support and resources to make the needed changes. For example, Copeland et al. found that some barriers to child physical activity were providers own personal attitudes (e.g., low self-efficacy) and preferences to avoid the outdoors because of weather or because it was too much work to get children ready (Copeland et al., 2012). FCCH providers are in a difficult situation with a demanding job yet have limited resources and support to improve their own health.

Our study has some limitations. We used a convenience sample of FCCH providers. Given the nature of the health risk self-reported measures, self-report bias is possible (other than height and weight which were measured). This may be particularly true for physical activity and fruit and vegetable reports, where providers in this sample were more likely to be meeting recommendations compared to other national samples. It is possible that given the nature of their job as child care providers they may feel like they are very physically active which may be an overestimation of their true level of activity. However, strengths include capturing different health behaviors that have not been captured before in an understudied, predominantly African-American population. Findings should be useful for hypothesis generation and raising awareness of the current condition of this population. Future studies should include additional health risk information (e.g., smoking, cancer screen) to better understand the vulnerabilities of this important classification of child care provider. Also, future studies should attempt to further understand the linkage between FCCH providers' health behaviors and their influence on children and the families that they serve.

5. Conclusion

Family child care home providers play an important role in the development of health behaviors of a large number of children in their care, in particular those who are underserved and vulnerable (Larson et al., 2011a). We found that although their standards for care may be high as seen by the star ratings of their family child care homes, their own risk and health behaviors are not meeting similar standards. In addition, these data should raise awareness to the financial circumstances these providers face which may be undermining their ability to provide

a high quality growing environment for the children they care for. The government should continue to find ways to invest in early childhood education. Although there has been an increase in the quality of child care with the reauthorization of the Child Care and Development Block Grant Act signed by President Barack Obama in 2014, continued funding for both access and availability to child care is needed. Furthermore, these results can raise awareness for the need to incorporate more training that focuses specifically on improving the health of providers or programs that encourages health promotion activities for these adults. In addition, future studies should explore how modeling and their own behavior is associated with child health outcomes.

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Conflicts of interest

None.

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